January 2015

Type EZH Relief or Backpressure Regulator

- **1500 psig / 103 bar Inlet / Outlet Rating**
- **Common Body Platform**
- **Bubble Tight Shutoff**
- **Full Usable Capacity**
- **In-Line Maintenance**
- **NPS 1 through 4 / DN 25 through 100 Body Sizes Available**
- **Precise Pressure Control**

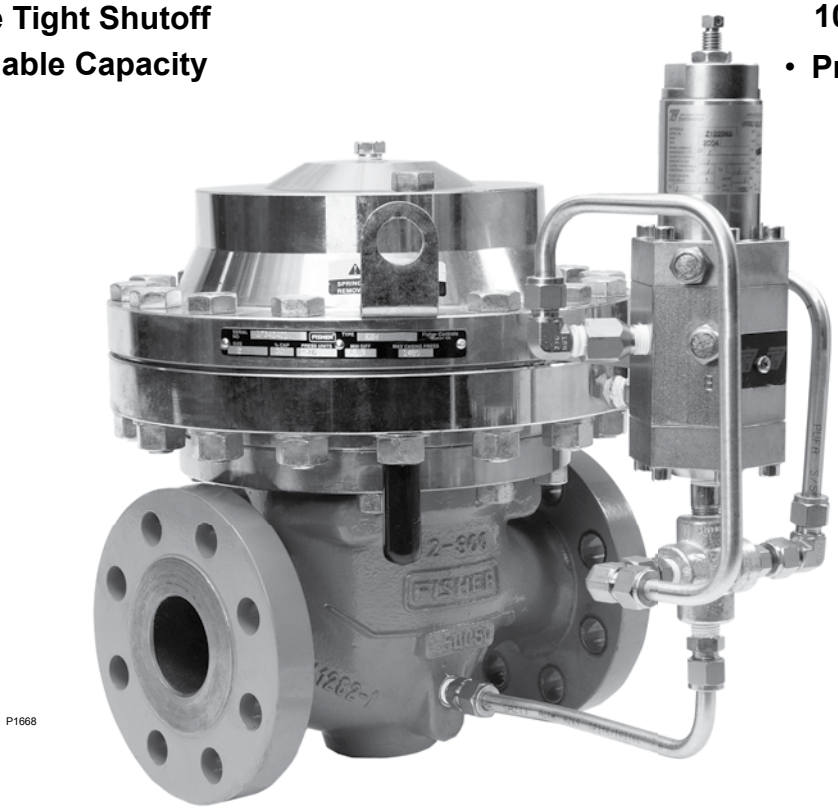

Figure 1. *Type EZH Relief Valve or Backpressure Regulator*

Features

- **Main Diaphragm**—The main diaphragm is Nitrile (NBR) reinforced with fabric and coated with a PVC, which protects and extends the service life of the regulator in applications where the liquids commonly found in natural gas pipelines tend to shorten diaphragm life.
- **Common Body Platform**—The Type EZH use the same standard Fisher® E-Body which is also used in Type EZR pressure reducing regulator and Types EZ, ES, ED and ET pressure reducing control valves. This will allow easy conversion from one product to another without the need to remove the E-Body from the pipeline.

D103574X012

Specifications

Ratings and specifications for the Type EZH are listed in the Specifications section below. Specifications for specific relief valve or backpressure regulator constructions are stamped on a nameplate attached to either the main actuator or the pilot spring case.

Available Configurations
Type EZH: Pilot-operated relief or backpressure regulator for low to high outlet pressure

Body Sizes, End Connection Styles and Pressure Ratings(1)
See Table 1

Maximum Allowable Pressures(1)
Inlet Pressure: 1500 psig / 103 bar
Outlet (Casing) Pressure: 1500 psig / 103 bar
Emergency Casing Pressure: 1500 psig / 103 bar

Minimum Buildup Pressure
Main Valve: 1500 psid / 103 bar d
Pilot *(Between loading pressure in pilot and loading sense pressure):* 1233 psid / 85.0 bar d

Minimum Differential Pressures
See Table 3

Relief Set Pressure Ranges
See Table 2

Flow and Sizing Coefficients
See Tables 5 and 6

Flow Capacities
See Table 7

Pilot and Filter-Regulator Flow Coefficients
Type PRX Pilot: C_g: 10.5; C_v: 0.36; C_1: 29

Pressure Registration
External

Pilot Connections
1/4 NPT

Temperature Capabilities(1)
Nitrile (NBR) Version:
-20 to 180ºF / -29 to 82ºC
Fluorocarbon (FKM) Version:
0 to 180ºF / -18 to 82ºC(2)

Option
- Travel Indicator

Construction Materials
Main Valve
Main Valve Body:
Type EZH: WCC Steel
Intermediate Flange and Actuator Casings: Steel, ASTM A350 LF2
Diaphragm Plates: Steel, ASTM A105
Diaphragm: Nitrile (NBR) with PVC coating
O-rings: Fluorocarbon (FKM)
Disk: Nitrile (NBR) or Fluorocarbon (FKM)

PRX Series Pilots
Body: Steel, ASTM 105
Trim: Stainless Steel
Elastomers: Nitrile (NBR) or Fluorocarbon (FKM)
Disk: Polyurethane (PU) or Fluorocarbon (FKM)

Approximate Weights
See Table 9

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
2. Type PRX Fluorocarbon (FKM) elastomer is limited to 0°F / -18°C.

- **Bubble Tight Shutoff**—The Type EZH have knife-edged, metal plug and a soft seat which provide bubble tight shutoff for use in applications where positive shutoff is required. For example: dead-end systems.
- **In-Line Maintenance**—Top entry design provides easier maintenance. Trim parts can be inspected, cleaned and replaced without removing the body from pipeline.
- **Precise Pressure Control**—The Type EZH use the PRX Series pilot system to provide stable and accurate pressure control.
- **Full Pressure Rating**—The Type EZH have equal inlet and outlet pressure rating of 1500 psig / 103 bar, which allows easier selection and requires no special startup or shutdown procedures.
- **Full Usable Capacity**—Fisher® brand regulators are laboratory tested. 100% of the published flow capacity can be used with confidence.
- **O-ring Design**—The Type EZH use elastomer O-rings instead of gaskets, reducing maintenance and assembly time.

Introduction

Type EZH is an accurate pilot-operated, pressure-balanced, soft-seated relief valve or backpressure regulator. It is designed for use in high pressure natural gas transmission/ city gate stations, large capacity distribution systems and power plant feeds. It provides smooth and reliable operation, tight shutoff and long life.

Pilot Descriptions

The Type EZH relief valve or backpressure regulator include a Type PRX/182 pilot mounted on the EZH Series main valves for relief valve or backpressure regulator applications. PRX Series pressure reducing pilots have the ability to handle a wide range of setpoints from 29 to 1160 psig / 2.0 to 80.0 bar.

Principle of Operation

A pressure relief valve is a throttling pressure control device that opens and closes to ensure the downstream pressure does not rise above a predetermined pressure. Fisher® relief valves cannot be used as ASME safety relief valves. A backpressure regulator is a device that controls and responds to changes in the upstream pressure. It functions the same as a relief valve in that it opens on increasing upstream pressure.

Relief Valve

As long as the inlet pressure is below the set pressure, the pilot control spring keeps the pilot valve plug closed. Inlet pressure passes through the restrictor and registers as loading pressure on the main valve diaphragm chamber. Force from the main spring, in addition to pilot loading pressure, provide loading pressure to keep the main valve diaphragm and plug assembly tightly shut off. When the inlet pressure rises above the set pressure, the pressure on the pilot diaphragm overcomes the pilot control spring and opens the pilot valve plug. The pilot then exhausts the loading pressure from the main valve diaphragm chamber. The pilot continuously exhausts gas when the inlet pressure is above the set pressure. The inlet pressure unbalance overcomes the main spring force and opens the diaphragm and plug assembly.

As the inlet pressure drops below the set pressure, the pilot control spring closes the pilot valve plug and the exhaust to atmosphere stops. Force from the main spring, along with pilot loading pressure, pushes the diaphragm and plug assembly onto the knife-edged seat, producing tight shutoff.

Backpressure Regulator

As long as inlet pressure remains below setpoint, the pilot control spring keeps the pilot valve plug closed. Inlet pressure passes through the upper port around the upper portion of the valve plug and then through the hollow passage in that valve plug. Force from the main spring, in addition to pilot loading pressure, provide downward loading pressure to keep the main valve diaphragm and plug assembly tightly shut off. When inlet pressure rises above the set pressure, pressure on the pilot diaphragm overcomes the control spring to close the upper port and stroke the valve plug to open the lower port. The pilot exhausts loading pressure from the main valve diaphragm chamber. Inlet pressure unbalance overcomes the main spring force to open the diaphragm and plug assembly.

While the main valve is throttling, the upper port of the pilot stays closed. The pilot exhausts only when it repositions the main valve. As inlet pressure drops below setpoint, the pilot control spring overcomes the diaphragm force to stroke the valve plug down to close the lower port and open the upper port. Force from the main spring, along with the pilot loading pressure, pushes the diaphragm and plug assembly onto the knife-edged seat, producing tight shutoff.

Capacity Information

Note

EZH Series flow capacities are laboratory verified; therefore, it may be sized for 100% flow using published capacities as shown. It is not necessary to reduce published capacities.

Table 7 show the natural gas regulating capacities of the Type EZH relief or backpressure regulator at selected inlet pressures and outlet pressure settings. Flows are in thousands of SCFH at 60°F and 14.7 psia (or in thousands of Nm³/h at 0°C and 1.01325 bar) of 0.6 specific gravity natural gas.

To determine equivalent capacities for air, propane, butane or nitrogen, multiply the capacity by the following appropriate conversion factor: 0.775 for air, 0.628 for propane, 0.548 for butane or 0.789 for nitrogen. For gases of other specific gravities, multiply the given capacity by 0.775 and divide by the square root of the appropriate specific gravity. Then, if capacity is desired in Nm³/h at 0°C and 1.01325 bar, multiply SCFH by 0.0268.

To find approximate regulating capacities at pressure settings not given in Table 7 or to find wide-open flow capacities for relief sizing at any inlet pressure, perform one of the following procedures. Then convert using the factors provided above, if necessary.

Critical Pressure Drops

For critical pressure drops (absolute outlet pressure equal to or less than one-half of absolute inlet pressure), use the following formula:

$$Q = (P_1)(C_g)(1.29)$$

Non-Critical Pressure Drops

For pressure drops lower than critical (absolute outlet pressure greater than one-half of absolute inlet pressure).

$$Q = \sqrt{\frac{520}{GT}}\ C_g P_1 SIN \left(\frac{3417}{C_1} \sqrt{\frac{\triangle P}{P_1}} \right) DEG$$

where,

Q = gas flow rate, SCFH
P_1 = absolute inlet pressure, psia (P_1 gauge + 14.7)
C_g = regulating or wide-open gas sizing coefficient
G = gas specific gravity of the gas
T = absolute temperature of gas at inlet, °Rankine
C_1 = flow coefficient
$\triangle P$ = pressure drop across the regulator, psi

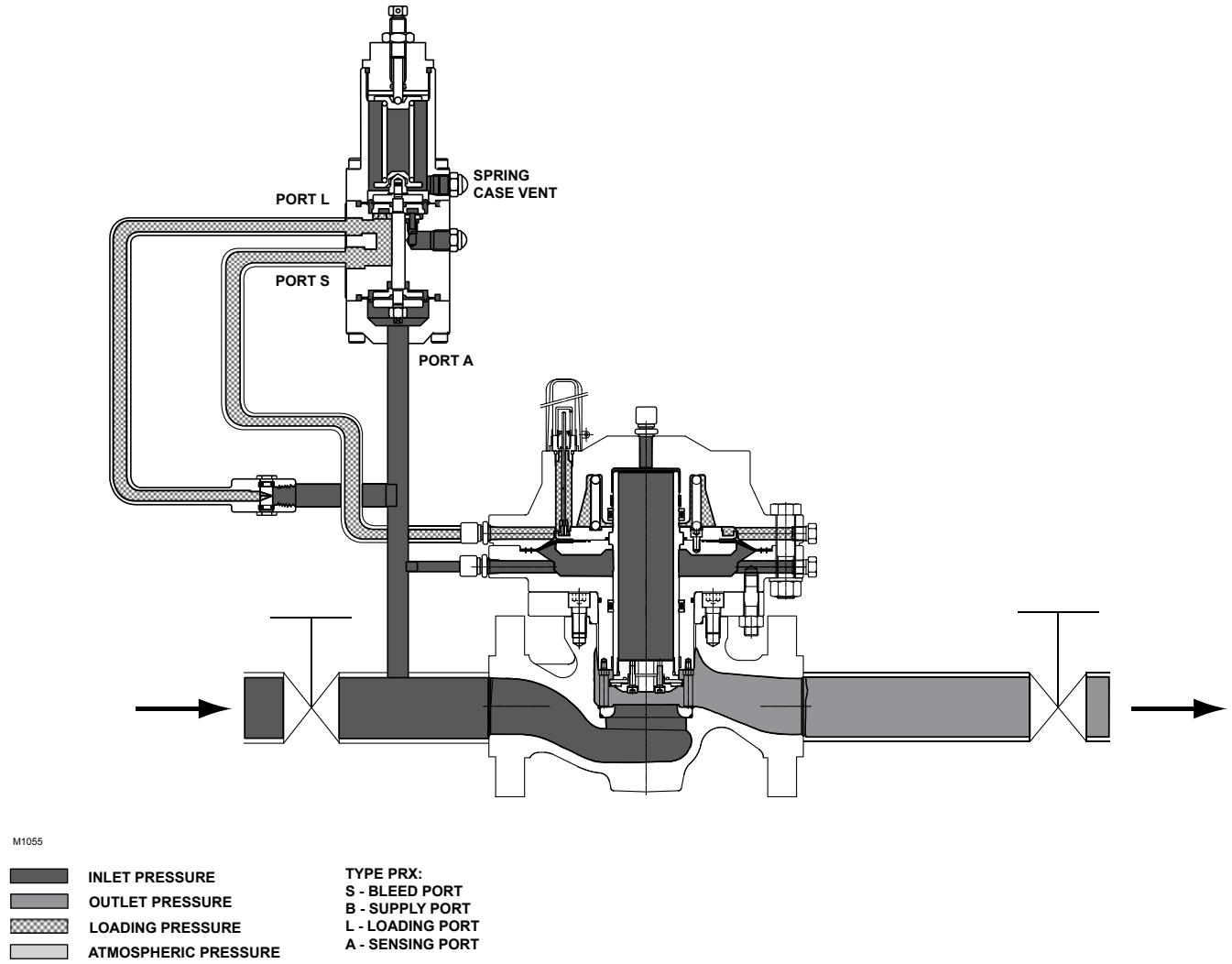

Figure 2. *Type EZH with Type PRX-182 Pilot*

Table 1. *Main Valve Body Sizes, End Connection Styles and Body Ratings*

MAIN VALVE BODY SIZE		MAIN VALVE BODY MATERIAL	END CONNECTION STYLE	STRUCTURAL DESIGN RATING	
NPS	DN			psig	bar
1	25	WCC Steel	NPT or SWE	1500	103
			CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103
2	50		NPT or SWE	1500	103
			CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103
3	80		CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103
4	100		CL150 RF	290	20.0
			CL300 RF	750	51.7
			CL600 RF or BWE	1500	103

Table 2. *Relief Set Pressure Ranges*

PILOT TYPE	RELIEF SET PRESSURE RANGE		PILOT CONTROL INFORMATION									
	psig	bar	Part Number	Color	Wire Diameter		Free Length		Maximum Operating Pressure		Maximum Emergency Pressure	
					In.	mm	In.	mm	psig	bar	psig	bar
PRX/182	29 to 116	2.0 to 8.0	M0255220X12	Black	0.157	4.00	2.16	55	609	42.0	1480	102
	73 to 290	5.0 to 20.0	M0255200X12	Gold	0.217	5.50	2.01	51				
	217 to 609	15.0 to 42.0	M0255190X12	Red	0.256	6.50	1.97	50				
PRX-AP/182	435 to 1160	30.0 to 80.0	M0273790X12	Clear	0.335	8.50	3.94	100	1160	80.0	1480	102

Table 3. *Minimum Differential Pressures*

TYPE	MAIN VALVE BODY SIZE		MINIMUM DIFFERENTIAL			
	NPS	DN	For 90% Capacity		For 100% Capacity	
			psid	bar d	psid	bar d
EZH	1	25	15.2	1.1	15.7	1.1
	2	50	12.0	0.83	13.8	0.95
	3	80	10.6	0.73	12.8	0.88
	4	100	15.8	1.1	16.4	1.1

Table 4. *Relief Set Pressure Build-Up Table*

PILOT TYPE	SET PRESSURE CONTROL RANGE, SPRING PART NUMBER AND COLOR, psig / bar	SET PRESSURE(1)		BUILD-UP OVER SET PRESSURE NEEDED TO BEGIN OPENING MAIN VALVE(2)		BUILD-UP OVER SET PRESSURE NEEDED TO FULLY OPEN MAIN VALVE(3)		PRESSURE DROP BELOW SET PRESSURE NEEDED TO RESEAT PILOT	
		psig	bar	psig	bar	psig	bar	psig	bar
PRX/182	29 to 116 / 2 to 8 M0255220X12 Black	30	2.1	1.7	0.12	3.4	0.23	0.9	0.06
		60	4.1	2.7	0.19	4.7	0.32	0.9	0.06
		80	5.5	2.8	0.19	5.3	0.36	0.9	0.06
		100	6.9	3.8	0.26	6.3	0.43	0.9	0.06
	73 to 290 / 5 to 20 M0255200X12 Gold	75	5.2	3.7	0.25	7.7	0.53	1.9	0.13
		100	6.9	3.7	0.25	9.2	0.63	1.9	0.13
		150	10.3	4.7	0.32	9.8	0.68	1.9	0.13
		200	13.8	5.0	0.34	10.9	0.75	1.9	0.13
		250	17.2	5.0	0.34	11.5	0.79	1.9	0.13
	217 to 609 / 14.9 to 41.7 M0255190X12 Red	225	15.5	5.0	0.34	13.7	0.95	2.5	0.17
		300	20.7	5.1	0.35	14.0	0.97	2.5	0.17
		400	27.6	5.2	0.36	14.5	1.00	2.5	0.17
		450	31.0	5.4	0.37	14.5	1.00	2.5	0.17
PRX-AP/182	435 to 1160 / 30 to 80 M0273790X12 Clear	450	31.0	5.4	0.37	14.9	1.03	2.9	0.20
		500	34.5	5.4	0.37	14.9	1.03	3.2	0.22
		600	41.4	6.2	0.43	14.9	1.03	3.2	0.22
		1050	72.4	6.2	0.43	15.6	1.08	3.2	0.22

1. Set pressure is defined as the pressure at which the pilot starts-to-discharge.
2. Crack point pressure of the main valve of the inlet pressure build-up over the set pressure at which the main valve starts audible flow.
3. Inlet pressure build-up over the set pressure for the main valve to achieve wide-open flow capacity.

Table 5. *Type EZH Main Valve with Standard Cage Regulating Flow Coefficients*

MAIN VALVE BODY SIZE		TRIM, % OF CAPACITY	LINE SIZE EQUALS BODY SIZE			2:1 LINE SIZE TO BODY SIZE PIPING		
NPS	DN		C_g	C_v	C_1	C_g	C_v	C_1
1	25	100	564	16.3	34.6	544	15.3	35.5
		80	436	12.3	35.4	423	10.9	38.7
		50	284	8.4	33.7	249	6.3	39.7
		30	172	5.3	32.5	157	4.0	39.1
2	50	100	2278	58.5	38.9	2110	62.9	33.5
		80	1719	47.1	36.5	1609	50.5	31.9
		50	1213	31.0	39.1	1177	33.0	35.6
		30	707	16.9	41.7	718	18.8	38.2
3	80	100	4960	133	37.3	4396	143	30.8
		80	3950	109	36.2	3294	97.2	33.9
		50	2550	63.6	40.1	2069	54.7	37.80
		30	1530	36.7	41.7	1339	39.8	33.6
4	100	100	7250	227	31.9	7170	229	31.3
		80	5750	165	34.8	5630	165	34.1
		50	3510	95.9	36.6	3460	95.5	36.2
		30	2130	56.7	37.6	2080	56.2	37.0

Table 6. *Type EZH Main Valve with Standard Cage IEC Sizing Coefficients*

MAIN VALVE BODY SIZE		TRIM, % OF CAPACITY	LINE SIZE EQUALS BODY SIZE			2:1 LINE SIZE TO BODY SIZE PIPING		
NPS	DN		X_T	F_D	F_L	X_T	F_D	F_L
1	25	100	0.61	0.61	0.89	0.80	0.59	0.89
		80	0.72	0.67		0.95	0.63	
		50	0.69	0.80		0.99	0.69	
		30	0.66	0.81		0.97	0.71	
2	50	100	0.73	0.59		0.69	0.61	
		80	0.84	0.68		0.72	0.70	
		50	0.97	0.69		0.84	0.72	
		30	0.99	0.70		0.92	0.74	
3	80	100	0.88	0.58		0.60	0.60	
		80	0.83	0.71		0.73	0.67	
		50	0.99	0.73		0.90	0.68	
		30	0.99	0.72		0.72	0.75	
4	100	100	0.63	0.63		0.62	0.63	
		80	0.76	0.74		0.74	0.74	
		50	0.85	0.77		0.83	0.77	
		30	0.88	0.78		0.88	0.77	

Table 7. *Capacities for Type EZH with PRX Series Pilot*

SET PRESSURE RANGE, PILOT SPRING PART NUMBER AND COLOR, psig / bar	SET PRESSURE		CAPACITIES IN THOUSANDS OF SCFH / Nm^3/h OF 0.6 SPECIFIC GRAVITY NATURAL GAS							
			1 NPS / DN 25		2 NPS / DN 50		3 NPS / DN 80		4 NPS / DN 100	
	psig	bar	SCFH	Nm^3/h	SCFH	Nm^3/h	SCFH	Nm^3/h	SCFH	Nm^3/h
29 to 116 / 2 to 8 M0255220X12 Black	30	2.1	36	0.96	139	3.73	307	8.23	458	12.27
	60	4.1	59	1.58	235	6.30	518	13.88	756	20.26
	80	5.5	75	2.01	298	7.99	654	17.53	952	25.51
	100	6.9	91	2.44	363	9.73	795	21.31	1154	30.93
73 to 290 / 5 to 20 M0255200X12 Gold	75	5.2	72	1.93	286	7.66	628	16.83	914	24.50
	100	6.9	91	2.44	366	9.81	801	21.47	1163	31.17
	150	10.3	130	3.48	522	13.99	1141	30.58	1654	44.33
	200	13.8	169	4.53	678	18.17	1482	39.72	2148	57.57
	250	17.2	207	5.55	834	22.35	1822	48.83	2639	70.73
217 t o 609 / 14.9 to 41.7 M0255190X12 Red	225	15.5	189	5.07	762	20.42	1664	44.60	2410	64.59
	300	20.7	246	6.59	992	26.59	2165	58.02	3136	84.04
	400	27.6	322	8.63	1298	34.79	2833	75.92	4102	109.93
	450	31.0	360	9.65	1452	38.91	3168	84.90	4588	122.96
435 to 1160 / 30 to 80 M0273790X12 Clear	450	31.0	360	9.65	1452	38.91	3168	84.90	4588	122.96
	500	34.4	398	10.67	1605	43.01	3501	93.83	5071	135.90
	600	41.4	474	12.70	1911	51.21	4167	111.68	6035	161.74
	1050	72.4	815	21.84	3286	88.06	7164	192.00	10,375	278.05

Table 8. *Type EZH Dimensions (See Figure 4)*

BODY SIZE, NPS / DN	DIMENSION, IN. / mm													
	A				C	D (Maximum)	E	F		G	H	J	R	
	NPT or SWE	CL150 RF	CL300 RF	CL600 RF or BWE				Type PRX	Type PRX-AP				Type PRX	Type PRX-AP
1 / 25	8.25 / 210	7.25 / 184	7.75 / 197	8.25 / 210	1.50 / 38.1	2.10 / 53	7.50 / 190	11.30 / 287	13.05 / 331	11.10 / 282	5.10 / 130	8.25 / 210	16.80 / 427	18.55 / 471
2 / 50	11.3 / 287	10.0 / 254	10.50 / 267	11.30 / 287	1.50 / 38.1	3.10 / 79	11.25 / 286	13.00 / 330	14.75 / 375	11.30 / 287	6.50 / 165	7.75 / 197	18.50 / 470	20.30 / 516
3 / 80	13.25 / 337	11.75 / 298	12.50 / 317	13.25 / 337	2.00 / 50.8	3.81 / 97	13.75 / 349	13.61 / 346	15.36 / 390	16.75 / 425	8.00 / 203	13.25 / 337	18.60 / 472	20.86 / 530
4 / 100	- - - -	13.9 / 353	14.5 / 368	15.5 / 394	2.00 / 50.8	5.06 / 129	15.5 / 394	14.1 / 358	15.85 / 403	16.8 / 427	10.03 / 255	5.5 / 140	26.1 / 663	26.1 / 663

Table 9. *Approximate Weights*

BODY SIZE, NPS / DN	APPROXIMATE SHIPPING WEIGHT, LBS / kg						
	NPT	SWE	CL150 RF	CL300 RF	CL600 RF	SCH 40	SCH 80
1 / 25	77 / 35	77 / 35	79 / 36	83 / 38	87 / 39	77 / 35	77 / 35
2 / 50	136 / 62	136 / 62	139 / 63	143 / 65	150 / 68	136 / 62	136 / 62
3 / 80	390 / 177	390 / 177	394 / 179	397 / 180	410 / 186	390 / 177	390 / 177
4 / 100	- - - -	433 / 197	451 / 205	481 / 219	514 / 234	433 / 197	433 / 197

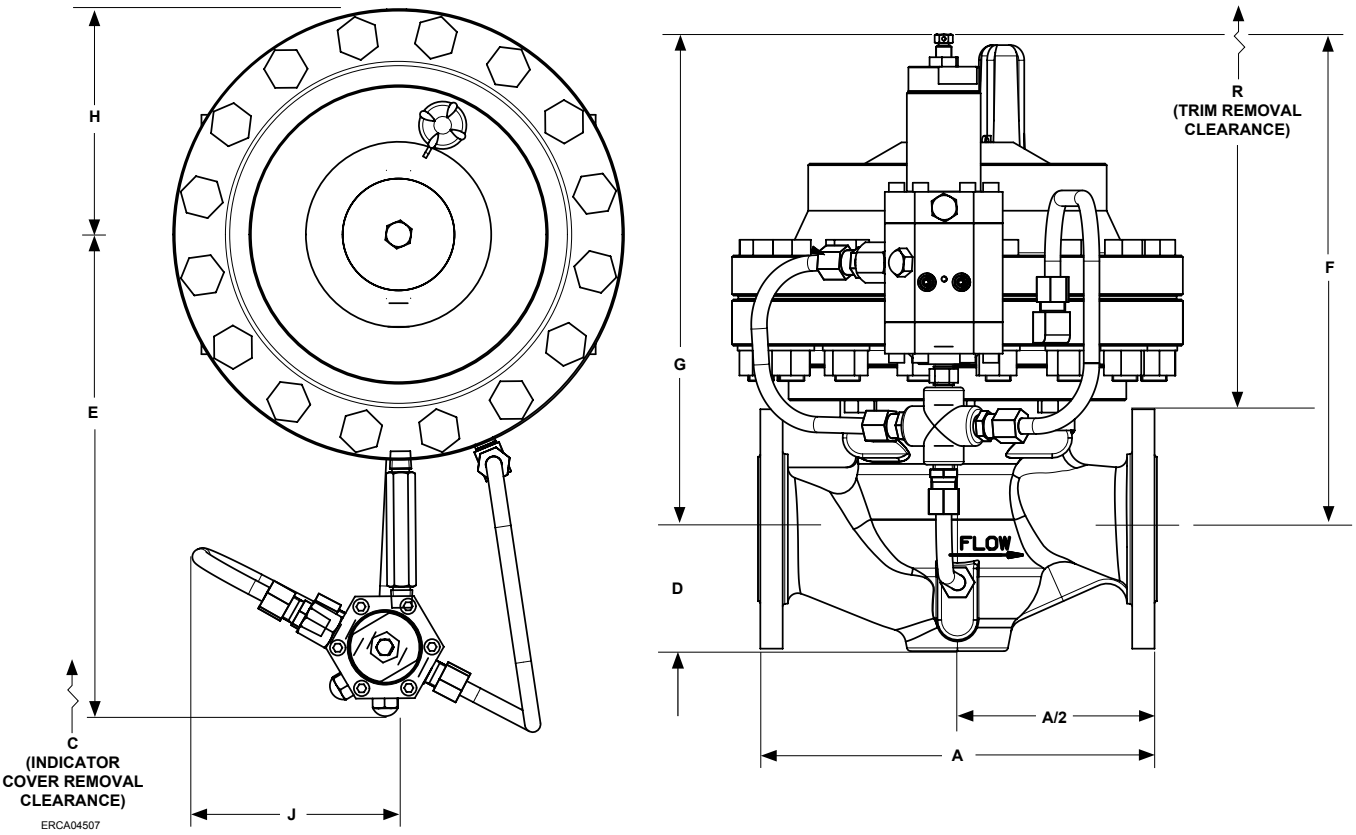

Figure 4. *Type EZH Dimensions (See Table 8)*

Ordering Information

Use the Specifications section on page 2 and carefully review the description to the right of each specification. Use this information to complete the Ordering Guide on this page.

Specify the desired selection wherever there is a choice to be made. Then send the Ordering Guide to your local Sales Office.

Ordering Guide

Type and Body Material (Select One)
WCC Steel
☐ Type EZH

Body Size (Select One)
☐ NPS 1 / DN 25***
☐ NPS 2 / DN 50***
☐ NPS 3 / DN 80***
☐ NPS 4 / DN 100***

End Connection Styles (Select One)
Type EZH
WCC Steel
☐ NPT (available for NPS 1 and 2 / DN 25 and 50 Body sizes only)***
☐ CL150 RF***
☐ CL300 RF***
☐ CL600 RF***
☐ SWE (Available for NPS 1 and 2 / DN 25 and 50 Body Sizes only)**
☐ BWE**
☐ PN 16/40 (For NPS 1 and 2 / DN 25 and 50 Body Sizes only)**
☐ PN 25/40 (For NPS 3 / DN 80 Body Size only)**

- continued -

Ordering Guide (continued)

Main Valve Disk Material (Select One)
- ☐ Nitrile (NBR) **(standard)*****
- ☐ Fluorocarbon (FKM)***

Pilot Type and Outlet Pressure Range (Select One)

Type PRX/182
- ☐ 29 to 116 psig / 2.0 to 8.0 bar, Black***
- ☐ 73 to 290 psig / 5.0 to 20.0 bar, Gold***
- ☐ 217 to 609 psig / 14.9 to 41.7 bar, Red***

Type PRX-AP/182
- ☐ 435 to 1160 psig / 30 to 80 bar, Clear***

Pilot Elastomer Material (Select One)
- ☐ Nitrile (NBR) / Polyurethane (PU) **(standard)*****
- ☐ Fluorocarbon (FKM)***

Travel Indicator (Select One)
- ☐ Yes***
- ☐ No***

Main Valve Replacement Parts Kit (Optional)
- ☐ Yes, send one replacement parts kit to match this order.

Pilot Replacement Parts Kit (Optional)
- ☐ Yes, send one replacement parts kit to match this order.

Regulators Quick Order Guide	
* * *	Readily Available for Shipment
* *	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Specification Worksheet

Application:

Specific Use _____

Line Size _____

Fluid Type _____

Specific Gravity _____

Temperature _____

Does the Application Require Overpressure Protection?

☐ Yes ☐ No

Pressure:

Maximum Inlet Pressure _____

Minimum Inlet Pressure _____

Differential Pressure _____

Set Pressure _____

Maximum Flow _____

Accuracy Requirements:

Less Than or Equal To:

☐ 5% ☐ 10% ☐ 20% ☐ 40%

Construction Material Requirements (if known):

_____

_____

Industrial Regulators

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside U.S. +1 972 548 3574

Asia-Pacific
Shanghai 201206, China
Tel: +86 21 2892 9000

Europe
Bologna 40013, Italy
Tel: +39 051 419 0611

Middle East and Africa
Dubai, United Arab Emirates
Tel: +971 4811 8100

Natural Gas Technologies

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside U.S. +1 972 548 3574

Asia-Pacific
Singapore 128461, Singapore
Tel: +65 6770 8337

Europe
Bologna 40013, Italy
Tel: +39 051 419 0611
Chartres 28008, France
Tel: +33 2 37 33 47 00

Middle East and Africa
Dubai, United Arab Emirates
Tel: +971 4811 8100

TESCOM

Emerson Process Management
Tescom Corporation

USA - Headquarters
Elk River, Minnesota 55330-2445, USA
Tels: +1 763 241 3238
+1 800 447 1250

Europe
Selmsdorf 23923, Germany
Tel: +49 38823 31 287

Asia-Pacific
Shanghai 201206, China
Tel: +86 21 2892 9499

For further information visit www.emersonprocess.com/regulators